

PATENT

IN THE STATES PATENT AND TRADEMARK OFFICE

Applicant:

CHOE, G.

Examiner:

Unknown

Serial No.:

10/038,125

Group Art Unit:

2652

Filed:

1/2/02

Docket No.:

SJO920010040US1

501.388US01

Title:

A METHOD AND APPARATUS FOR PROVIDING PRECISE

CONTROL OF MAGNETIC COUPLING FIELD IN NIMn TOP SPIN

VALVE HEADS AND AMPLITUDE ENHANCEMENT

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on

Michael T. Wallace

Name

Signature

SUBMISSION OF FORMAL DRAWINGS

Box Missing Parts Assistant Commissioner for Patents Washington, D.C. 20231 22865
PATENT TRADEMARK OFFICE

Dear Sir:

Enclosed herewith are eleven (11) sheet(s) of formal drawings for the above-referenced patent application in response to the communication dated February 1, 2002.

Respectfully submitted,

ALTERA LAW GROUP, LLC 6500 City West Parkway, Suite 100 Minneapolis, Minnesota 55344-7701 952-253-4127

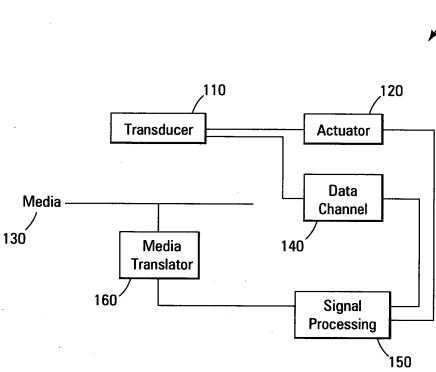
Date: <u>9-1-02</u>

By: Michael T. Wallace Reg. No. 45,420

MTW/tmj

Inventor: Choe, G.
ETHOD AND APT TUS FOR PROVIDING PRECISE CONTROL MAGNETIC COUPLING
FIELD IN NiMn SPIN VALVE HEADS AND AMPLITUDE ELEMNCEMENT
Docket no.: SJ09-2001-0040US1 / 501.388US01 Serial Number 10/038,125

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Inventor: Choe, G.

Title: A METHOD AND APT ATUS FOR PROVIDING PRECISE CONTROL MAGNETIC COUPLING FIELD IN NIME SPIN VALVE HEADS AND AMPLITUDE EXPONEMENT Docket no.: SJ09-2001-0040US1 / 501.388US01 Serial Number 10/038,125

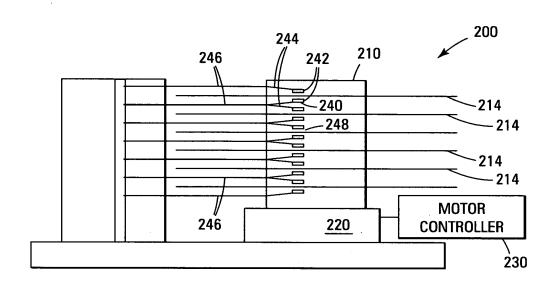
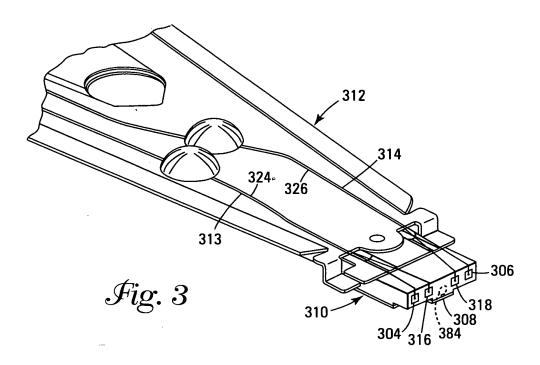
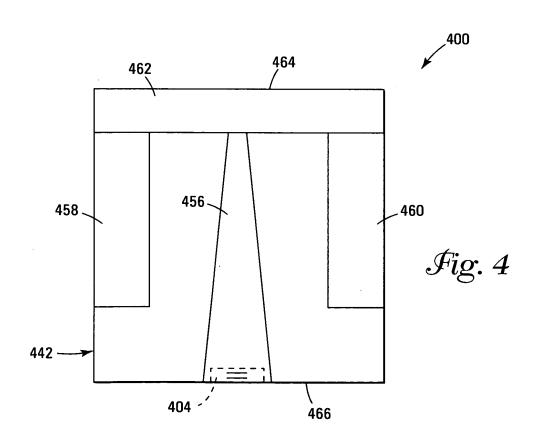


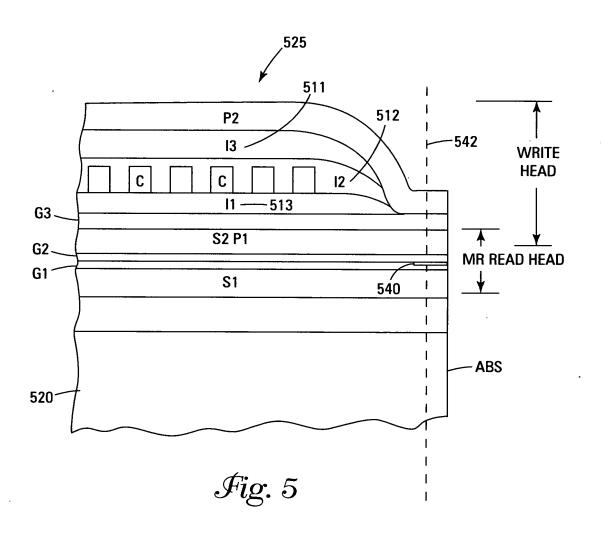
Fig. 2

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Inventor: Choe, G.

Title: A METHOD AND APP ATUS FOR PROVIDING PRECISE CONTROL MAGNETIC COUPLING
FIELD IN NIMR SPIN VALVE HEADS AND AMPLITUDE EN NCEMENT
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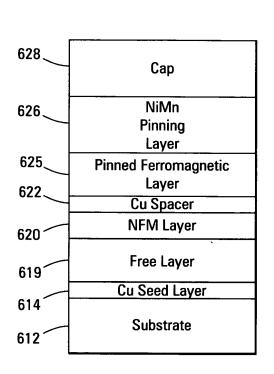


Fig. 6

Inventor: Choe, G.

Title: A METHOD AND APPARATUS FOR PROVIDING PRECISE CONTROL MAGNETIC COUPLING FIELD IN NIMP P SPIN VALVE HEADS AND AMPLITUDE EXPANCEMENT Docket no.: SJ09-2001-0040US1 / 501.388US01 Serial Number 10/038,125

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	As-deposite	As-deposited free layer	Annealed free lay	Annealed free layer at 250°, 5 hrs
	γį	УР	λi	уρ
Without	$6 \times 10^{-5} \text{ Å}$	-3.2 × 10 ⁻⁶ Å	8 x 10 ⁻⁵ Å	-0.9 × 10 ⁻⁶ Å
oxidation				
With Cu seed	$4 \times 10^{-5} \text{ Å}$	-3.1 × 10 ⁻⁶ Å	4 × 10 ⁻⁵ Å	$-1.5 \times 10^{-5} \text{ Å}$
and spacer				
oxidation				

Fig. 7

Inventor: Choe, G.
ETHOD AND APPEATUS FOR PROVIDING PRECISE CONTROL MAGNETIC (
FIELD IN NIMM SPIN VALVE HEADS AND AMPLITUDE EXPONEMENT
Docket no.: SJ09-2001-0040US1 / 501.388US01 Serial Number 10/038,125

MAGNETIC COUPLING NCEMENT

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800

Hf vs Cu spacer thickness

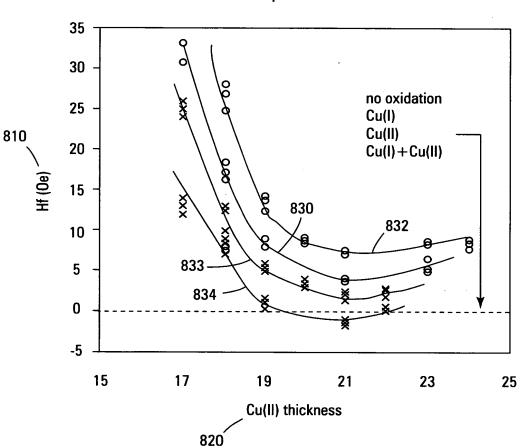
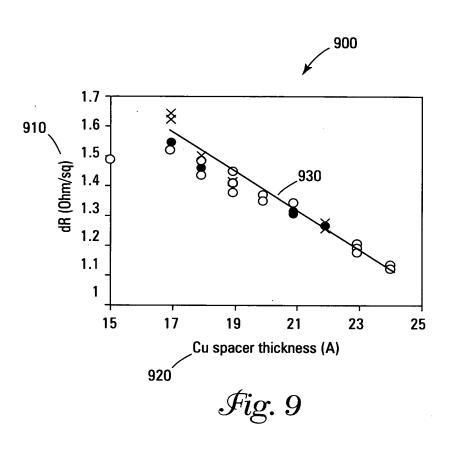


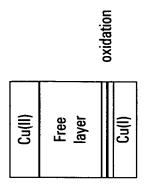
Fig. 8

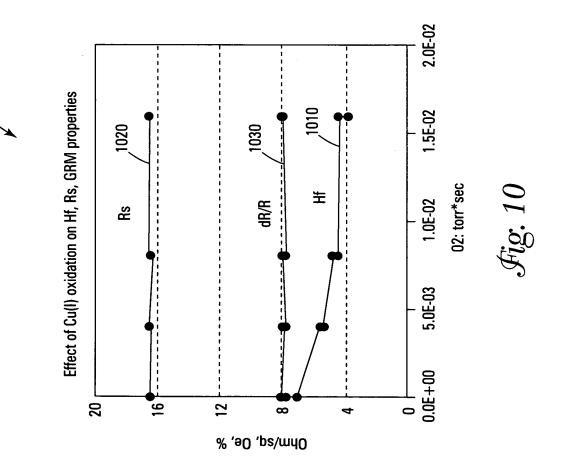
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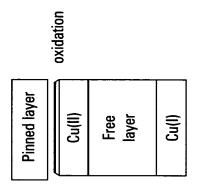


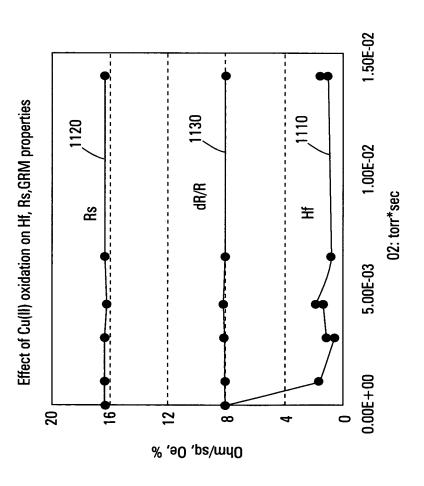
Inventor: Choe, G.
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Inventor: Choe, G.

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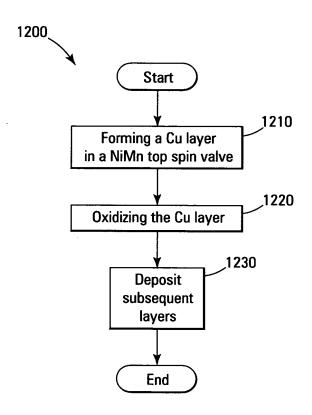


Fig. 12